Geophysical Research Abstracts
Vol. 15, EGU2013-12074, 2013
EGU General Assembly 2013
© Author(s) 2013. CC Attribution 3.0 License.

NDT for Complex Projects

Mario Carnevale
Hager GeoScience, Inc., Woburn, Massachusetts, United States (mcarnevale@hagergeoscience.com)

Non-destructive testing of structures composed of various types of materials is performed using a variety of methods. Most commonly, electromagnetic and acoustic methods are used to perform this task. Advances in computer software and electro-mechanical hardware have resulted in semi-automated systems for performing simple low-cost in-situ concrete testing. These systems are designed to be operated by anyone who can read a manual and push the right buttons. Although useful in many circumstances, we ask: "What happens when concrete structures are not simple and are too complex to be analyzed by these semi-automated systems and, most importantly, by minimally trained operators?"

Many infrastructure projects are boldly pushing the limit of traditional engineering design. As structures become more complex, the methods and techniques used to evaluate these structures must also evolve. A first step towards adapting geophysical methods to evaluate complex structures is to develop pre-investigation conceptual models of possible responses that structures will have to available geophysical methods. This approach is important for designing the geometry and data acquisition parameters necessary for achieving the desired results. Examples of case by case assessments of the application of GPR to concrete investigations are examined. These include complex concrete wall structures, soil tunnel structures, and airport runways.

HGI's adaption of ground penetrating radar (GPR) and seismic methods for assessing the substrate of a heavily reinforced concrete structure up to seven feet thick is reviewed. A range of GPR antenna frequencies were used to image the concrete and the underlying material. Time and frequency domain GPR analyses where used in the assessment. A multi-channel seismic survey using a roll-along data collection technique was used to assess the resonant frequency of the concrete structure, the nature of the underlying medium, and behavior of the structural system.